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Since the day I purchased my 32K Color Computer with Extended Color Basic and a cassette drive in May 1983, my attention has been turned toward disk—and with it, the probability of an alternate DOS.

I have read reviews and columns devoted to Flex and OS/9 and have been weighing their relative benefits and shortcomings when, suddenly, there at Color Expo '83, I found myself absorbed in the demonstration of this expansion interface called Colormate with SDOS. I was totally intrigued; yet, when re-examining back issues of my magazines, I discovered the only attention it received was a single press release in the column reserved for new products. No comparisons with Flex or OS/9; no comment on its operation and relative usefulness; nothing about SDOS and what we consumers/users might expect from it.

I figured that with their highly-structured Basic language (label-name oriented computer, not line-number oriented) someone would take quick notice. So far, nothing.

My hope is that you will run a comparison of SDOS/Colormate against Flex and OS/9—perhaps with other DOSes.

Also, since the 6809E MPU is so sophisticated and flexible, why hasn't someone written a version of OS/VS for it? OS/9, with its multi-user capability, makes it seem possible. What do you think?

*Randy Stanard
Fountain Valley, CA*

One of the hardest tasks of a magazine editor is getting hardware companies to send hardware for reviews. Many times the answer is "we're selling all we make, we don't have one to spare to send you." Just as frequent is the response "We'll send you one immediately," but the device is never sent.

Complicating the issue is finding a writer with enough technical skill to give the product a fair evaluation.

One reason why you haven't seen OS/VS is market factors. OS/VS is a sophisticated system, and until vendors perceive the Color Computer market as sophisticated enough to use such a product in large quantities, they won't devote the time or resources to moving the product to the Color Computer (enough people have to be interested to make it possible for them recoup their investment).

I would like to hook up a numeric keypad for my CoCo that would work like the numeric keypad on the Model III/4 I use at work. Does someone out there manufacture something like that or could something like that be rigged up without a lot of soldering or jerry-rigging? I do a lot of numeric work with my CoCo.

*Gerald L. Horton
Antioch, IL*

The December 1983 (pg 207) issue of *Rainbow* has an article on adding a numeric keyboard to your Color Computer. The keypad attaches directly to one of the PIAs in the computer and requires a keypad driver program (included with the article). I don't know of any keypads that don't require a driver program.

A friend of mine showed me a game he'd pro-

grammed. He owns an Apple II. He programmed the game using a disk called "The Arcade Machine," by Broderbund Software.

I was wondering if there is any disk like The Arcade Machine, which used simple one-word commands to program games, available for the Color Computer? If so, where may I get one?

*Vince Matthews
Clinton, NC*

"The Game Machine" is the only program I've heard of that does what you want. The program is sold on a ROMpak and you must use the ROMpak to play the games you create. In other words, you can't make a game and then give it to a friend. To play it your friend would have to have The Game Machine ROMpak. Unfortunately, I can't find the manufacturer's address.

Spectrum Projects (P.O. Box 21272, Woodhaven, NY, 11421) sells "Bjork Blocks," a utility for creating graphics screens for use in games.

Sorry I can't help you more.

I wish to thank Robert C. Lake, CDP, for writing the excellent program MOVSCRIP which appeared in The Color Computer Magazine in August 1983.

As you know, it can be used to customize printing from the Radio Shack Scripsit ROMpak to the Radio Shack LP VII printer. However, I have a Radio Shack DMP-120 printer which uses different codes for wide printing. The program runs fine except it doesn't do wide printing. I'm thankful to be able to have a backup to the ROMpak but sure wish I could change the printing.

Since I got a tape from the Scripsit ROMpak, I figured I could solve my old problem of wipeouts of Radio Shack "Spectaculator" by using the same program. It didn't work out. The program ran up to line 610 where I got an FC error. The original line 610 is; POKE(J-24576,PEEK(J-24576)-(24576/256). Can anyone help with either of these two problems?

*Jim Fairchild
Newark, DE*

All you have to do is substitute the DMP width codes for the LP VII code in the program. Look up the codes in your manual and re-run the modified program on your Scripsit cartridge.

Your second problem is that the value Scripmov derives for J is incorrect for Spectaculator, hence the FC error. Unfortunately I don't have Spectaculator, so I can't help you. Does anyone else have a solution?

Last Christmas my wife and I bought a Color Computer II for our Christmas present to each other. In March we bought another one so she could play bridge while I was writing on my Marine sea story (I used to be a Marine fighter pilot, and also graduated from Naval aviation electronics school). The local Radio Shack upgraded one to 64K, but they goofed and had to send it off. While it was gone I upgraded the other with a Green Mountain Micro kit. It took only a few minutes and it couldn't work better.

I have a bunch of questions I hope you can answer. First, is this thing a super piece of equipment or a piece of junk? Recently I worked for hours writing a statement to file regarding a congressional

hearing held here. I was using the Radio Shack Color Scrispit ROMpak. For some reason, before I got the thing printed, the computer locked up. I tried every key and finally hit the Reset button and it was all gone. On the other hand, our typewriter is now on a closet shelf. We use this CoCo and 8510 printer every day for word processing. I never learned to type or spell. A sixteen page story about my Guadalcanal experiences is going to be published in our national veterans newspaper soon. I typed it all on my CoCo and my wife corrected the spelling.

The problem is the display, the keyboard, and the need for more RAM. I wonder if instead of spending money to fix these problems if it would be better to buy a Model 4 or something else. Hot CoCo had an article about building a new keyboard using a HiTec set of keys costing \$30. How does it compare to the commercial replacement keyboards? Would a video monitor and a hundred dollar green monitor give me usable letters at 64/line? Is there any way to connect two CoCos and have more RAM? What about the Micro RGS 128K RAM card? What happens to my Telewriter 64 lowercase letters if I install a Green Mountain Micro lowercase board? Would I get a better display? Could I erase the lines in Telewriter for lowercase and have more memory? Do the spray cans for re-inking the 8510 ribbon work?

The magazines talk about the 6809 CPU being very fast but the Radio Shack catalog lists the CoCo clock speed as .894MHz and the Model 4 as 2.03 MHz. What does this mean? It says the CoCo has a screen resolution of 256-192, but they do not give a comparable figure for other computers. Does that mean the CoCo is not capable of producing a good word processing display?

Dennis E. Byrd
Moab, UT

Glad you like the Green Mountain Micro upgrade. It sure saves money over having Radio Shack do the work.

Sorry to hear you had problems with the CoCo locking up on you. I regard the CoCo as a great piece of equipment, although it is sensitive to power line interference. One way to improve reliability is to use a line filter and surge suppressor. The line filter removes spurious power line spikes caused by electric motors and similar devices, while the surge suppressor smooths out fluctuations caused by heavy-duty electrical equipment such as toasters, ovens, refrigerators, and heaters. (Ever notice the TV screen shrink in size when the electric heater kicks in? When it cuts out, a minor surge is put on the power lines.)

Radio Shack sells both devices. Try the line filter first; if you still have problems, get a surge suppressor. These things can get quite expensive, so shop carefully. If the inexpensive devices don't seem to help, take them back for a refund and get more powerful units.

And don't forget to save your files to tape periodically, say, once an hour. That way, if something goes wrong you have a back-up copy ready.

Building your own keyboard is certainly cheaper than the commercial boards and, from what I've seen, is just as good in quality. I use a Mark Data

keyboard on my CoCo and the only complaint my wife has is that the keys are too stiff (hard to push). I never really noticed.

Changing to a video monitor would improve the quality of the letters (the screen is clearer), but the actual definition of the characters is determined by the character generator chips used in the CoCo. Because the CoCo has 256 dots for each display line, dividing by 64 means each character can use only four dots (including spacing between characters). This is what makes the characters hard to read.

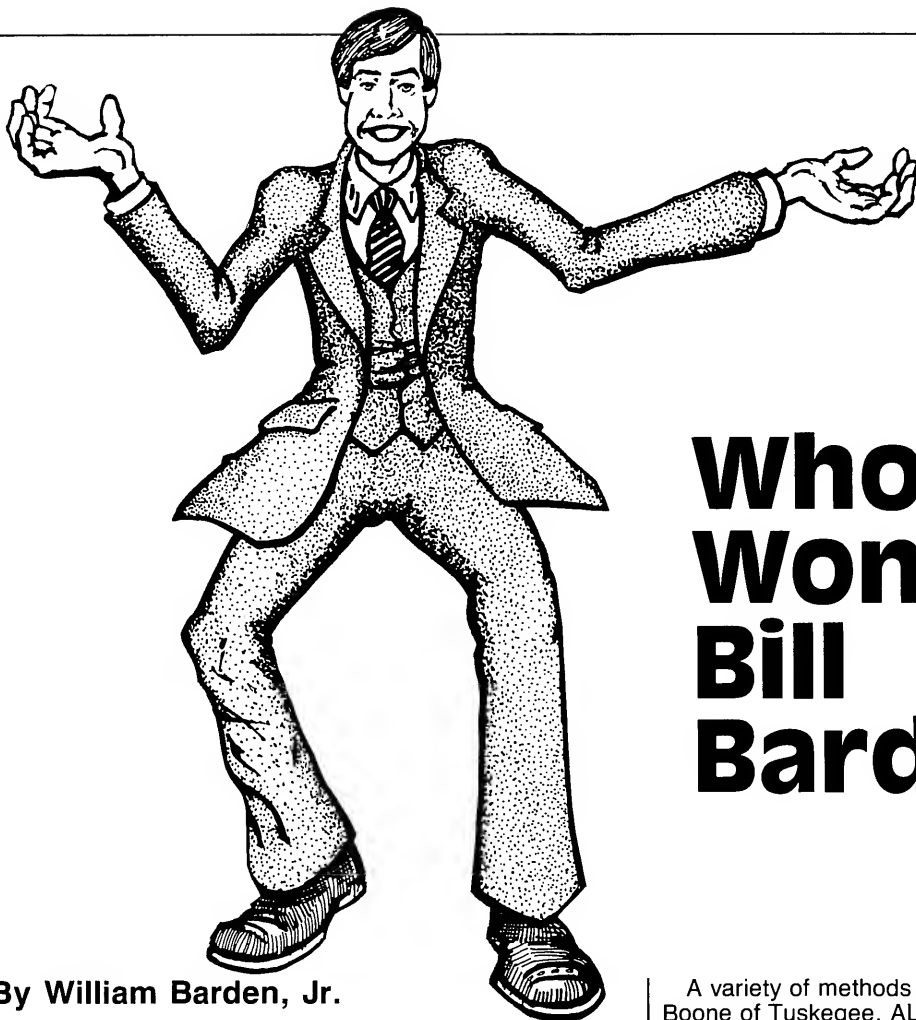
The Green Mountain Micro lowercase kit redefines the dots used in the characters in an attempt to make them easier to read, but is limited to 32 characters per line just like the built-in Radio Shack character generator. You can't use the lowercase kit to put more than 32 characters on one line. Changing the character generator chip has no effect on Telewriter-64; its lowercase characters are still defined and stored in RAM. As far as I know you can't release the RAM Telewriter-64 uses for this purpose.

If you really want to improve your display, get the PBJ (PO Box 813, North Bergen, NJ, 07047, 201-330-1898) Wordpak ROMpak. This plugs into your CoCo and can drive a standard video monitor. It provides 80-columns per line, with 24 lines per screen. If you have a dual port expansion cable, you can use the Wordpak with a disk system. Patches are available for TRSDOS, FLEX, and OS-9. Wordpak uses driver software that replaces the hooks in RAM so that output normally sent to the video display is routed instead to Wordpak and the attached monitor.

Sorry, but there isn't any practical method of interconnecting two CoCos to give one user more RAM. The limit of 64K is imposed by the design of the 6809 CPU. The 128K card from Micro RGS (751, Carre Victoria, Suite 403, Montreal, Quebec, Canada, H2Y 2J3, 514-287-1563) uses "bank switching" to select which section of the 128K board is available at a time. You don't get 128K of contiguous RAM, just four banks of 32K RAM (with Basic ROMs in place) or two banks of 64K RAM in all-RAM mode.

Yes, the spray cans for re-inking the 8510 ribbons work, but remember that the fabric in the ribbon will eventually wear out and need replacing. The spray can just prolongs the useful life of the ribbon.

The different figures for the computers' clock speeds mean simply that the Model 4 is faster than the CoCo, but .894 MHz is still a very fast operating speed (a car that can do 75 mph is still a fast car even though others can go 150 mph or more). The screen resolution given in the Radio Shack catalog is the resolution you can control. That is, from Basic or an assembly language problem, you can control all 256-192 pixels used in the Color Computer display. The other computers in the catalog have a much lower resolution (Models I/III have 64-48 usable resolution; the smallest section you can access in a box two video pixels square). And that does mean the CoCo will always have a poor word processing display (unless you use a hardware modification of some kind).



Who Won Bill Barden?

By William Barden, Jr.

My apologies for the delay in reporting the contest results. The original contest rules were published in the December 10, 1984 *UnderColor*, with a deadline of January 15, 1985. I added a few weeks for stragglers, but should have completed the results before now.

In case you didn't catch the original write-up on the contest, it went something like this: "Write an Extended Basic program that draws a spiral figure on graphics screen 0 in PMODE 4 (256-192 resolution)." No assembly language was allowed.

I hadn't programmed the problem before, and frankly thought there would be some clever way to draw the spiral that would be twice as fast as any other. The results were somewhat surprising.

Many entries presented two versions of the problem, one using the high-speed POKE and one without. As D. Dean Receptor of Knoxville, TN said, "I think the high-speed POKE should be invalid since not all machines can use it and it has nothing to do with Basic technique." I agree, and "normalized" all entries so they did not use the high-speed POKES (high-speed POKES essentially change the memory clock rate.)

Dean, by the way, had one of the more elegant solutions to the problem:

```
10 PMODE4: SCREEN1.0: PCLS1:X=&HFF: E=&HC0:
DRAW"BMO,191: CO": K=4: S=8: DRAW"R=X: U=E: L=X;":
FORA=&HBB TOS STEP:&H08: X=X-K: Y=A: DRAW"D=Y: R=X;":
X=X-K: Y=Y-K: DRAW" U=Y: L=X;": NEXT: DRAW"D3"
12 GOTO 12
```

Although fast, it was not fast enough to win.

A variety of methods were used to draw the spiral. R.W. Boone of Tuskegee, AL tried a series of POKES directly to screen memory for each of the line segments (290 FOR N=1237 TO 1286 STEP -1: POKE N, 45: NEXT N). A good idea, but there were too many Basic statements, which added to the overall time.

Most entries used the line command as a base to draw the figure. This method was almost fast enough to match the winning method, but not quite.

The winning method? Use of the draw command, as in Dean's example above. Here's another example of draw, from Lonnie Underwood of Pell City, AL:

```
O TIMER=0: A=59: B=4: PMODE4: PCLS: SCREEN1:
DRAW"BMO,192R255": FORW=192TO8STEP-8: Z=W+A: Y=W-B:
X=Z+B: DRAW" U=W:L=X:D=Y:R=Z;": NEXT: T=TIMER
```

This is a clever use of computed parameters for the draw in a nicely compacted form.

The winners, however, used a brute force approach, and this is not to denigrate their entry. They are Andy Picton and Greg Buschmann of Anoka, MN. Their entry consisted of two huge draw statements:

```
20 DRAW "BMO,192R225U191L255 . . . R110
25 DRAW "M180,132U71L105D67 . . . R20
30 SCREEN1
9999 GOTO9999
```

I won't include all the code for the draws, but you get the idea. The draws here create a minimum of overhead by eliminating any loop or variable management.

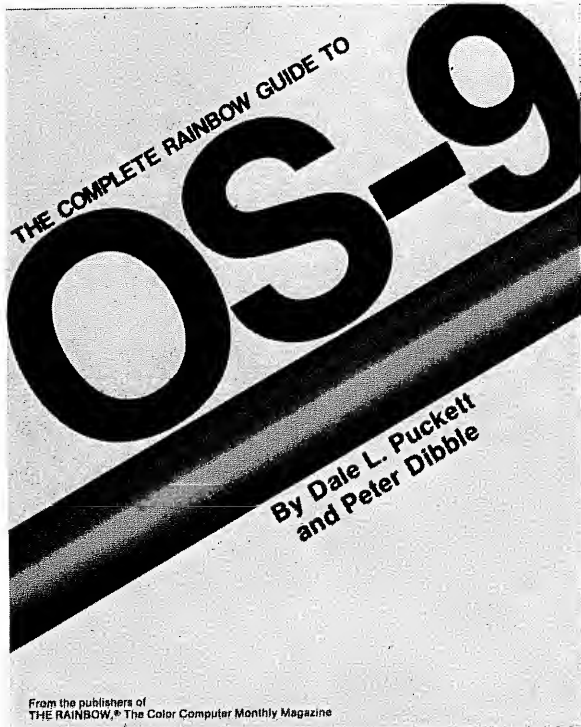
Runner-up was Mark Hurst of Sheridan, OR, who used the same method. His version was just a hair slower.

Greg and Andy win either two hours with Nastassia Kinski or one hour each on the phone with me. I won't wait up . . . (end)

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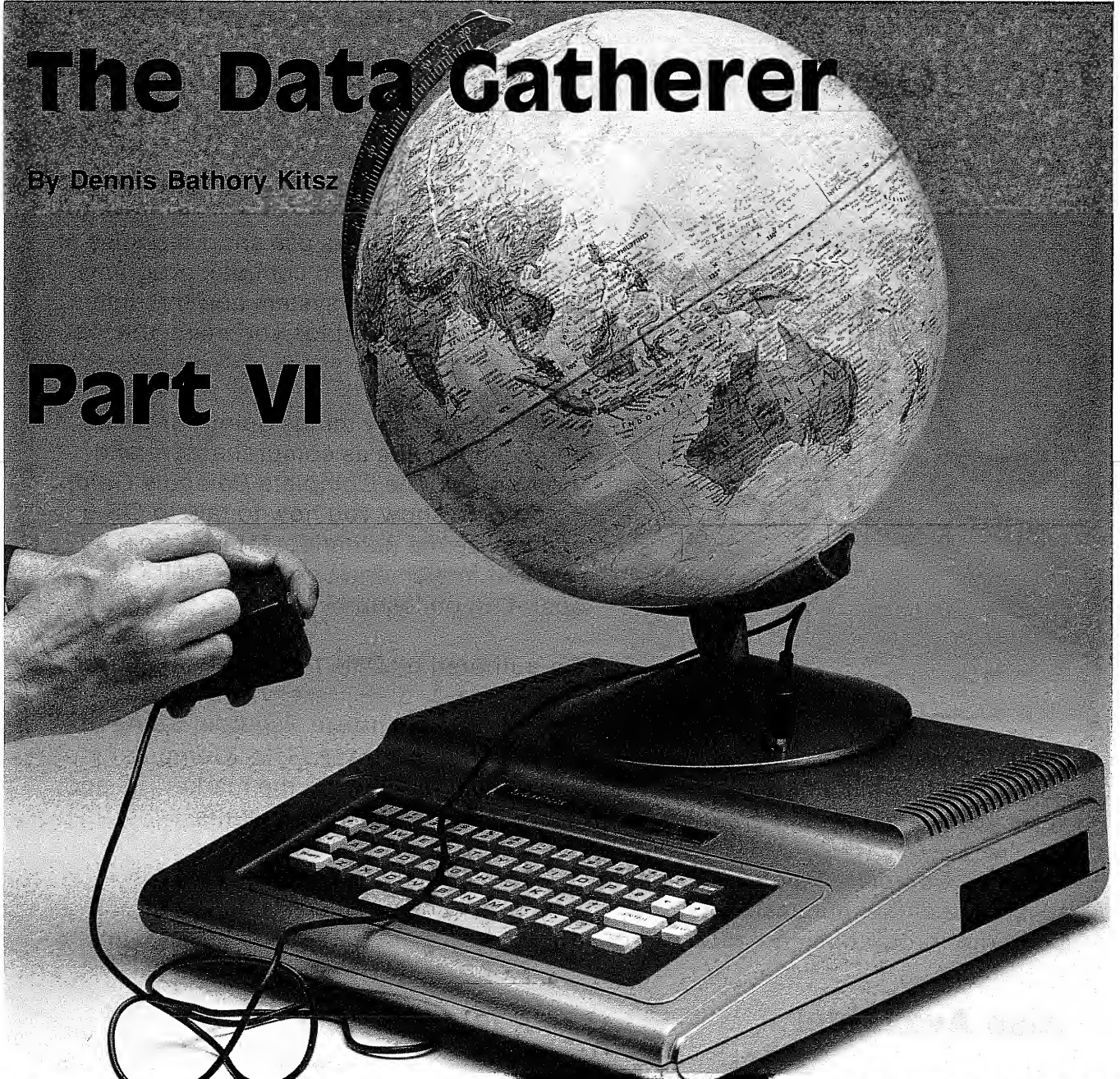
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The Data Gatherer

By Dennis Bathory Kitsz

Part VI



I've described the central routines of the Data Gatherer Operating System (DGOS), leaving some convenience features to note. The remaining subroutines include parallel printing, turning the clock on and off, and—most interesting—a method of forcing a Basic program to auto-boot from the DGOS read-only memory (ROM). Finally, I have some application ideas, some updates, a few optional, supplementary software modules, and a suggestion for a neat little thermal printer.

About Printing

The Color Computer's printing method is serial; that is, each letter is defined to the printer by a sequence of binary digits. A starting digit, a series of binary digits, and a stop bit are sent from the computer to the printer. This type of method has advantages and disadvantages: it requires a

simple 4-wire cable and connector, and the inexpensive Radio Shack printers are set up for serial input. But this method is slower (600 bits per second are sent), and, at least on the Color Computer, is not inexpensively achieved, requiring much software "overhead." The computer's central processing unit (CPU) must accurately time out each bit before sending another.

Parallel printing can be much faster because an entire character is sent to the printer along a multiconductor cable. When the printer is ready for another character it signals the computer. The advantage to this method is speed. No laborious timing is required from the CPU, and the printer can gobble up the characters into its own memory buffer—quickly releasing the computer for your use.

The Data Gatherer adds this parallel printing feature

without the loss of the serial printing method. The software to drive it begins at line 3720 of Listing 1. An ASCII character is plucked from location PRINTC and sent to the printer via port \$FF56, followed by a strobe ("here it is, printer") through port \$FF55. The printer accepts and stores or prints the character (depending on its own method of operation).

For more than one character, this method is expanded. Beginning at line 3830, the X register points to the address of a string of characters. The character is sent to the printer (line 3930), and a print-ready routine (lines 3980-4010) is checked. This is the printer's handshake ("yes I'm ready, computer" or "wait a second, computer") line, found at port \$FF54. Most Centronics-compatible parallel printers have four handshake lines: printing in progress (usually head in motion), busy (usually handling paper), out of paper, or fault. However, only a single busy/ready line is required on newer parallel printers, and it is found at bit 6 of port \$FF54. As soon as bit 6 goes high, the printer is ready for another character.

If the character to be printed is \$00 (a usual end-of-string marker) or \$0D (a carriage return), the process is completed. Note that these features are limited to ASCII characters; you must use the STR\$ command before printing a number (check your Basic manual if you're not familiar with STR\$).

The final DGOS print routine is something not available in Radio Shack's Basic; this is the print-video-screen segment, beginning at line 4030. Essentially, it is a loop within a loop. The outer loop counts 16 lines of text, the inner loop 3 rows of characters. Since these characters are being plucked from the video screen, however, they don't match the usual ASCII pattern, and a conversion process (lines 4090-4160) is completed first. Carriage returns are dropped in after every 32

characters for a printed copy of the video display. Note that this only prints the normal video screen, not the high-resolution screens.

Clock Watching

Because I built this software out of little subroutine modules, and clock display on the clock display off software got dropped in here. The idea is to provide a continuous display of time and date so that it is never missed should the monitoring system print the video screen. The on routine begins at line 4330, where the clock display routine is simply inserted in the chain of interrupt service. The clock off segment (line 4430) merely replaces the clock service routine with the original vector, effectively bypassing the clock display. Nothing to it. Naturally, since the real-time clock/calender is a hardware device, such on-and-off goings on don't affect its operation.

Optimized Conversions

There are two additional digital-to-analog (D/A) and analog-to-digital (A/D) subroutines provided with DGOS. After completing the original, reasonably structured subroutines, I decided to sacrifice prettiness of structure for speed—especially important in A/D conversions.

The optimized D/A routine is found at line 4590 and the optimized A/D routine is at line 4840. Both operate very much like the structured routine, so I'll spare you the explanation. The real difference in approach is that the direct page (a faster CPU technique) is moved from \$00 (where Basic uses it) to \$7F (where DGOS uses it) for this conversion process, and then returned to \$00 when DGOS is done.

Listing 1. The Data Gatherer—Second Half

```

C281 B6 7F96 03720 PRINTI LDA PRINTC * Get character to print
C284 B7 FF56 03730 STA STA * Place into printer port
C287 B6 3C 03740 LDA LDA * Control register value
C289 BA 08 03750 ORA ORA * Print high strobe mask
C28B B7 FF55 03760 STA STA * Print high strobe mask
C28E B4 F7 03770 ANDA ANDA * Print low strobe mask
C290 B7 FF55 03780 STA STA * Strobe set to low
C293 BA 08 03790 ORA ORA * Print high strobe mask
C295 B7 FF55 03800 STA STA * Strobe set to high
C298 39 03810 RTS * Back to calling program
03820 *
C299 BE 7F88 03830 PRINTS LDX STRSTR * Addr. of string to print
C29C A6 80 03840 PRNTLP LDA ,X+ * Get first char. to print
C29E 81 00 03850 CMPA #00 * Is it 0?
C2A0 27 14 03860 BEQ FINISH * Then printing done
C2A2 81 00 03870 CMPA #00D * Is it carriage return?
C2A4 27 09 03880 BEQ FINOD * Then printing done
C2A6 B7 7F96 03890 STA PRINTC * Store in char. to print
C2A9 8D 06 03900 BSR PRNTI * And print it
C2AB 8D 0A 03910 BSR PRDY * Check printer ready
C2AD 20 ED 03920 BRA PRNTLP * Back for next character
C2AF B7 7F96 03930 FINOD STA PRINTC * If 0D, then print c.r.
C2B2 8D 00 03940 BSR 03940 * Go print the c.r.
C2B4 8D 01 03950 BSR PRDY * Check for printer ready
C2B6 39 03960 FINISH RTS * Back to calling program
03970 *
C2B7 B6 FF54 03980 PRDY LDA COMPI * Get port FF54
C2BA 84 40 03990 ANDA #040 * Bit 6 is BUSY*
C2BC 26 F9 04000 BNE PRDY * IF LOW, then wait
C2BE 39 04010 RTS * Back when okay
04020 *
C2BF BE 7F8A 04030 PRINTV LDX SSTART * Point to screen start
C2C2 BF 7F88 04040 STX STRSTR * And place for reference
C2C5 86 10 04050 LDA #010 * 16 lines per screen
C2C7 C6 20 04060 PRINTZ LDB #020 * 32 characters per line
C2C9 34 06 04070 SMLINE PSHS A,B * Save line and character
C2CB A6 80 04080 LDA ,X+ * Get first character
C2CD 1F 89 04090 TFR A,B * Place in B for work
C2CF C4 60 04100 ANDB #060 * VDG to ASCII conv.
C2D1 26 04 04110 BNE NEXTP
C2D3 8A 60 04120 ORA #060
C2D5 20 06 04130 BRA DOIT
C2D7 C1 60 04140 CMPB #060
C2D9 26 02 04150 BNE DOIT
C2DB 84 3F 04160 ANDA #03F
C2DD B7 7F96 04170 DOIT STA PRINTC * Store the character
C2E0 8D 9F 04180 BSR PRNTI * Print the character
C2E2 8D 03 04190 BSR PRDY * Check printer ready
C2E4 35 06 04200 PULS A,B * Restore line and char.
C2E6 5A 06 04210 DECB * Get next character
C2E7 26 E0 04220 BNE SMLINE * If last, then next line
C2E9 34 06 04230 PSHS A,B * Restash A and B
C2EB 86 0D 04240 LDA #00D * Get carriage return
C2ED 87 7F96 04250 STA PRINTC * Store it
C2F0 8D 8F 04260 BSR PRNTI * And print the c.r.
C2F2 8D C3 04270 BSR PRDY * Check for printer ready
C2F4 35 06 04280 PULS A,B * Restore line and char.
C2F6 4A 06 04290 DECA * Get to next line
C2F7 26 CE 04300 BNE PRINTZ * IF not done, next line

```

DENNIS BATHORY KITSZ

Label	Address	OpCode	Description	Comment	Address	OpCode	Description	Comment
C2F9 39	04310	RTS	* Back to calling program		C376 DD	82	04930	STD
C2FA 1A	04320 *	ORCC	* Interrupts off		C37B E7	1F	04940	LDX
C2FC 34	04340	PSHS	* Save X register for later		C37D 8A	80	04960	ORA
C2FE BE	04350	LDX	* Point to inter. vector		C37F A7	01	04970	STA
C301 BF	04360	SIX	* Place in jump position		C381 97	95	04980	STA
C304 BE	04370	LDX	* Get clock int. vector		C383 86	3C	04990	LDA
C307 BF	04380	SIX	* Place into Basic vector		C385 C6	34	05000	LDB
C30A 35	04390	PULS	* Restore X from caller		C387 A7	84	05010	STA
C30C 1C	04400	ANDCC	* Interrupts back on		C389 E7	84	05020	STB
C30E 39	04410	RTS	* Back to calling program		C38B A7	84	05030	STA
	04420 *				C38D 96	95	05040	LDA
C30F 34	04430	CLKOFF	* Stash caller's X		C38F 8A	F0	05050	ORA
C311 BE	04440	LDX	* Get op. sys. vector		C391 84	7F	05060	ANDA
C314 BC	04450	CMPX	* Compare with jump		C393 A7	01	05070	STA
C317 27	04460	BEQ	* If same, clock is off		C395 86	3C	05080	LDA
C319 BF	04470	SIX	* Else restore vector		C397 A7	84	05090	STA
C31C 35	04480	PULS	* Restore caller's A		C399 E7	84	05100	STB
C31E 39	04490	NOPE	* Back to calling program		C39B A7	84	05110	STA
	04500 *				C39D B6	FF54	05120	LDA
C31F 1A	04510	INTDIS	* Turn interrupts off		C3A0 97	92	05130	STA
C321 34	04520	PSHS	A,B,X,Y * Stash all the stuff		C3A2 49		05140	ROLA
C323 17	FE96	LBSR	* Display the clock		C3A3 24	12	05150	BCC
C326 86	FF02	LDA	* Reset interrupt latch		C3A5 DC	84	05160	LDD
C329 35	04550	PULS	A,B,X,Y * Restore caller's stuff		C3A7 44		05170	LSRA
C32B 1C	04560	ANDCC	* Interrupts back on		C3A8 56		05180	RORB
C32D 6E	9F 7F99	JMP	* And off you go		C3A9 DD	84	05190	STD
	04580 *				C3AB DC	82	05200	LDD
C331 1A	04590	FASTDA			C3AD 93	84	05210	SUBD
C333 FC	04600	LDX	VALHI * O		C3AF DD	82	05220	STD
C336 8E	04610	SIX	* PORT+1 * P		C3B1 0A	91	05230	DEC
C339 E7	1F51	LDX	-1,X * T		C3B3 26	C3	05240	BNE
C33B 8A	04620	ORA	* I		C3B5 20	10	05250	BRA
C33D 47	04630	STA	1,X * M		C3B7 DC	84	05260	LDD
C33F B7	7F95	STA	STASH		C3B9 44		05270	LSRA
C342 86	04640	LDA	* I		C3BA 56		05280	RORB
C344 C6	04650	LDB	* Z		C3BB DD	84	05290	STD
C346 A7	04660	STA	* X		C3BD DC	82	05300	LDD
C348 E7	04670	STB	* D		C3BF D3	84	05310	ADD
C34A A7	04680	STA	* X		C3C1 DD	82	05320	STD
C34C B6	04690	LDA	* /		C3C3 0A	91	05330	DEC
C34F 8A	04700	ORA	STASH		C3C5 26	B1	05340	BNE
C351 84	04710	ANDA	* A		C3C7 96	92	05350	DONE2
C353 A7	04720	STA	* R		C3C9 49		05360	ROLA
C355 86	04730	LDA	1,X * I		C3CA 25	07	05370	BCS
C357 C6	04740	LDB	* O		C3CC DC	82	05380	LDD
C359 A7	04750	STA	* U		C3CE C3	0001	05390	ADD
C35B E7	04760	STB	* T		C3D1 DD	82	05400	STD
C35D A7	04770	STA	* I		C3D3 35	08	05410	EXIT2
C35F 1C	04780	ANDCC	* N		C3D5 1C	EF	05420	ANDCC
	04790		* E		C3D7 39		05430	RTS
	04810		*				05440 *	
	04820 *					00	05450	SETDP
C362 1A	04830	SETDP	* Force faster execution			D000	05460 *	EQU
C364 34	04840	FASTAD	* Interrupts off			0019	05470	BASLST
C366 86	04850	PSHS	DP			001B	05480	BASSTT
C368 1F	04860	LDA	* Save DP register			0000	05490	BASEND
C36A 86	04870	TFR	A,DP * Get new DP value			0551 *	05500	PCLER1
C36C 97	04880	LDA	* And put into place			D000	05520	ATEST
C36E CC	04890	STA	*			03	05530	BEQ
C371 DD	04900	LDD	* \$0800 *			8088	05540	JMP
C373 CC	04910	STD	* \$07FF * P					



```

PCLEAR1 0C00
PORT     FF50
PRDY    C287
PRINT1  C281
PRINTS  7F96
PRINTS  C299
PRINTV  C28F
PRINTZ  C2C7
PRINTLP C29C
REDO1   C234
REDO2   C23F
REDO3   C266
REDO4   C26F
REINIT  C08A
RUNCR   C408
SAVE    7F93
SIGNON  C43E
SMLINE  C2C9
SSTART  7F8A
STASH   7F95
STOR32  7F9B
STROBE  C1AB
STRSTR  7F88
STUFF   C050
SWAP    C17D
SWAPC   C258
SWAPD   C253
SWAPX   C25C
UCTK    C16C
UCTK2   C3B7
VALHI   7F86
VECTOR  C420
VIDEO   C05F
XGHANL  C00E
XCLKOF  C022
XCLKON  C020
XCLKST  C01C
XCONVT  C010
XCPVRT  C030
XDACOT  C016
XDISCK  C01E
XFSTAD  C018
XFSTDA  C01A
XGETI6  C014
XGETCK  C024
XGETVL  C012
XINIT   C00A
XIPL    C008
XPRNT1  C026
XPRNTS  C028
XPRNTV  C02A
XRENT   C00C
XSWAPC  C02E
XSWAPD  C02C
ZZZZZZ  C59F

C14B
AGAIN2  C378
ATEST   C3D8
AUTO    C000
BASEND  001B
BASLST  D000
BASSIT  0019
BPROM   C3E0
BXFER   C3ED
CHANNL  C111
CLKOFF  C30F
CLKON   C2FA
CLKSAV  7F8B
CLKSET  C262
CLOCK   FF40
COMPIN  FF54
CONVRT  C135
COPYRT  C051
COUNT  7F91
DAGOUT  C18E
DAYS    C429
DISCLK  C1BC
DISPLC  7F8C
DOLT    C2DD
DONE    C17D
DONE2   C3C7
EXIT    C18B
EXIT2   C3D3
FASTAD  C362
FASTDA  C331
FINOD   C2AF
FINISH  C2B6
GET16   C0F6
GETCLK  C230
GETVAL  C10C
GOTIT   C12B
H1STRB  7F8F
INIT    C04B
INTDIS  C31F
INTER   010D
INTJMP  7F99
INTVEC  7F97
IPL     C032
JDOIT   C081
JNEXT   C07B
LASTIN  7F92
LICK    C227
LOSTRB  7F90
MASK    7F94
MORE    C3F9
MVALUE  7F82
MXCHAN  7F8E
NEXT    C125
NEXT16  C0FE
NEXTP   C2D7
NOPE    C31E
OFFSET  7F84
OUTIPL  C089
    
```

Basic Program Auto-Boot

Automatically having a long Basic program appear just a second after turning on the power is a treat. This routine doesn't really need the Data Gatherer to work . . . just an EPROM plopped into a ROMpak and inserted in the edge connector will do. I'll describe the routine first, then show you how to get it to work.

At line 5520, the routine looks for a byte of \$00 to indicate the start of a Basic sign-on message. Otherwise, it sets up all the Basic parameters (memory ready, restart, and input/output parameters).

The Basic program is stored in EPROM at \$D000. A block move of the program from the EPROM is done from there to RAM at \$0C00 (lines 5610-5690), and an end-of-program byte is stored. An exact copy of the original Basic program is now in place.

The remaining task is to get it to run automatically. For that solution I turn to that famous software technique known as "the nailed club." No fancy tricks here; I just jam the letters R, U and N along with a \$00 delimiter byte into the keyboard buffer, and jump to the not-so-bright Basic interpreter. It parses the letters, sees *run*, and, quite obediently, the program takes off.

So how do you get a program into EPROM? You will need a 2764, 27128 or 68766 EPROM (the Data Gatherer takes a 2764 or 27128), and an EPROM programmer. The downloading routine is already part of DGOS, but can be used separately; Listing 2 is a hex dump of a simplified downloading routine for use without DGOS.

After you have created a Basic program you are satisfied

with and wish to auto-boot, follow these steps carefully:

1. Be sure the first commands in the Basic program are `PMODE0:PCLEAR1`, and `CSAVE` the program to tape as you ordinarily would.
2. Turn the computer off and on again, and at the ok prompt, type and enter: `PMODE0:PCLEAR1`. Do *not* run the program!
3. From command mode (not as a program line), type and enter the following:

```
PRINT HEX$(256*PEEK(&H1B) + PEEK(&H1C))
```

This will tell you where your program ends; be sure to write down the result.

4. Prepare a fresh tape for recording, and set the controls to record mode. From command mode (not as a program line), type and enter the following:

```
CSAVEM"PROGNAME",&H0C00,&H****,&H80C0
```

The four stars represent the number displayed in step 3 above; use your own name for "PROGNAME."

5. The Basic program will save as a binary file to tape. This special binary file is what you must place into your EPROM (not the usual `CSAVED` program).

Now turn to your EPROM programmer instructions, and burn the downloading routine in Listing 2 into the first 72 bytes of an EPROM, or burn the Data Gatherer Operating System into the first 1,500 or so bytes. You'll have lots of blank space between DGOS and the Basic program.

Load and burn the binary file of the Basic program into the EPROM beginning at its relative address of \$1000. Place the EPROM into a ROM cartridge (or into the Data Gatherer), and your auto-boot system is ready to use.

And A Few More Things . . .

The remainder of the DGOS listing consists of a reset vector to keep the clock display from ending up in an infinite loop, and a group of clock and sign-on messages.

I promised you a few additions to DGOS. These I added to enhance the speed of the Basic portion of your programs, since POKEing values into memory and PEEKing them back out is clumsy. Instead, I've added commands USR0 and USR1, defined as variables X0 and X1. (You'll have to pick up these addresses from your assembly listing.)

First, DEFUSR0 = X0. Then, where X is the channel to be input from the analog-to-digital converter, Q = USR0 (X) will return the raw value of the conversion (0 to 4095) in variable Q.

Second, DEFUSR1 = X1. Then, where X is a value to be output through the D/A converter, Q = USR1 (X) will output the value of X. In this routine, Q is a dummy variable, and will be returned as the value of X.

Listing 3 presents the USR0 and USR1 subroutines.

More Than Cute

More than cute is the reaction I had upon seeing the Seiko MTP-410 thermal printer. Measuring only 3.5 inches wide, 1.5 inches deep and 1 inch tall, the MTP-410—together with its interface—fits on a blank area of the Data Gatherer PC Board, turning the Data Gatherer into a complete data logging system with a printed record.

The Seiko consists of the printer mechanism itself, plus a small (2.25 by 2.75 inch) parallel interface board, and costs under \$100. It can be configured to print up to 40 characters per line, and prints both standard ASCII and Kata Kana.

If you're interested in the Seiko printer, you can obtain one from Green Mountain Micro, or by contacting Seiko Instruments for distributor information at 2990 West Lomita Boulevard, Torrance, California 90505, (213) 530-8777. (end)

Figure 1. Safe Variable Use

The following Basic subroutine permits "safe" use of the Basic variables. In future versions of Data Gatherer software, the vectors from \$C008-\$C030 will be preserved, although the subroutines themselves may have their execution (EXEC) locations moved. Use this subroutine to assure that your EXECs to the Data Gatherer will work properly with future upgrades.

```
50000 I = 1 : J = &H7F80
50010 FOR V = &HC008 TO &HC030 STEP 2
50020 V(I) = 256*PEEK(V) + PEEK(V+1)
50030 I = I+1 : NEXT V
50040 IP = V(1) : IN = V(2) : RE = V(3)
50050 CH = V(4) : CO = V(5) : GE = V(6)
50060 G6 = V(7) : DA = V(8) : FD = V(9)
50070 FA = V(10) : CS = V(11) : DK = V(12)
50080 CN = V(13) : CF = V(14) : GK = V(15)
50090 P1 = V(16) : PS = V(17) : PV = V(18)
50100 SD = V(19) : SC = V(20) : CT = V(21)
50110 CL = J+59 : DP = J+12 : MV = J+2
50120 MX = J+13 : PC = J+22 : SR = J+8
50130 ST = J+27 : VA = J+6 : RETURN
```

If necessary for speed and memory economy, the subroutine above can be condensed into a single line.

Listing 2. Simplified Downloading Program

```
4000 * 44 4B 86 55 97 71 CC 80
4008 * C0 DD 72 BD B9 5C 8E D0
4010 * 00 10 8E 0C 00 10 9F 19
4018 * 0C 1A EC 81 ED A1 10 83
4020 * 00 00 26 F6 ED A1 10 9F
4028 * 1B 8E 02 DD CC 52 55 ED
4030 * 81 CC 4E 00 ED 81 C6 04
4038 * 4F 97 70 8E 02 DC 7E AC
4040 * 7F 12 12 12 12 12 12 12
```

Listing 3. USR0 and USR1 Subroutines

```
7000      INTCNV   EQU      $B3ED
7010      GIVABF   EQU      $B4F4
7020      *
7030      USR0     JSR      INTCNV
7040                               CMPB   #16
7050                               BHI     FCERR
7060                               STB     MXCHAN,PCR
7070                               LBSR   GETVAL
7080                               JMP     GIVABF
7090      *
7100      USR1     JSR      INTCNV
7110                               CMPD   #4095
7120                               BHI     FCERR
7130                               STD     VALHI
7140                               JSR     DACOUT
7150                               RTS
7160      *
7170      FCERR    LDB     #8
7180                               JMP     $AC46
```


Chipset Upset



By Bob Rosen

The R.M.S. chipset (Raster Memory System) is the new chipset Motorola has been working on. It provides sophisticated video and memory management for the 6809E, 6800B or the 68000. It is really two systems in one chip set: machine 1 mode provides the full power of this system, and machine 2 mode gives you the backward compatibility with 6809E systems using the MC6883-MC6847 combination.

Highlights: 1 Megabyte memory capability; horizontal resolution: 64 to 640 pixels; vertical resolution: 64 to 500 pixels; Bit-plane mode and six character/object-oriented list modes; 32 colors from a palette of 4096; 32 to 32000 user-definable characters in the list modes; text oriented attributes: underline, flash, invert, color, double height and width; ASCII and mosaic characters in internal ROM; game-oriented attributes: collision, priority, color offset; virtual screen that is larger than visible screen, smooth scrolling; and eight hardware objects positioned by x,y registers.

FMS uses a block of DRAM as screen memory as does the CoCo, but by using registers within the RMS this display can be larger than the actual display screen. The DRAM can be four banks of: 16K, 64K or 256K or dynamic RAM. The banks can be used one at a time or expanded to the full memory capability. One thing to remember is that when using one bank of memory the system is slowed down somewhat, because it is not able to spread out its access to other parts of the system. When there are two banks or more they are time-division multiplexed onto the data bus as well

as DRAM refreshed and MPU accessed in the same cycle. Also, more colors in bit plane mode can be accessed.

Registers

This mode of operation relates in part to the machine 2 function of the system. We will refer to it as the CoCo mode, as it is an emulation of the 6883(74LS783)-6847 (or the new 6847-T1 chip which has full 96 character set and is made for the 6883). It looks like this FF22 is one of the registers in the second PIA in the CoCo. This is emulated by a register in the RMS chip set, so that FF20-23 are not used by the normal decode we know. Instead, FF24-FF3F is used in place of this if a PIA is used for other things. The other registers we know so well are in their usual place, except the memory switch m1, m0 and the speed modes (FFd6-FFdd). These POKES are not used, the page flip switch FFd4-d5 is usable, as is the type page mode FFde-FFdf. The 64K mode is accessible, just like our CoCo. This takes care of registers we know; let's now take a look at the RMS registers. In this mode, they are located at FF80-FFbf. Access to FF20-FF21 and FF23 will have been changed to FF24-FF27.

The whole structure of the PIA's would be very different, as there is no interlink to the first PIA as in the CoCo from the VDG chip (the vertical and horizontal interrupt lines). These are now connected between the two RMS chips. Now comes the part that is most interesting: the make-up of the registers at FF80-FFbd in the initialization of this mode. You will note that changes can be made to this, after initialization, many, many possible changes could be done depending on your knowledge and expertise in assembly language.

Registers	Value	Comments	Color Map Register
Memory Map	\$10	Machine 2, Folded Map Page 00	CMR00 \$40F0 Green The ms-4 keeps the RMS on
Display Data Mode	\$00		LMR 01 \$0FF0 Yellow
Interrupt Status	\$00		CMR02 \$000F Blue
Border Color	\$10	CMR 10, Video Disabled	CMR 03 \$0F00 Red
Object Available	N/A	Read only	CMR 04 \$0FFF Buff
Paging	\$0F	Page F	CMR 05 \$00FF Cyan
Page Independent Blocks	\$00	Top or Bottom or both of 64K memory can be reserved for Basic pointers and screens that are not to be moved when paging (memory management).	CMR 06 \$0F0F Magenta
Vertical Scroll	\$00	Move the screen one line at a time	CMR 07 \$0F80 Orange
Horizontal Scroll	\$00	Move screen horizontally	CMR 08 \$0000 Black
DRC start address	\$0000	Dynamically redefinable character set (characters that you define within memory).	CMR 09-CMR0F \$0000
True Object Start Address	\$0000	Objects that can be moved at will around the screen (8 registers = 8 objects at one time or more in real time, can collide with other objects, or fixed ones, this will set the collision status X,Y location to be read by software.	CMR 10 \$00F0 Green—Alpha/Semigraphics Border Color
Fixed Object Start Address	\$0000	As above	CMR 11 \$0F80 Orange—As Above
Collision Status	N/A	Read only	CMR 12 \$00F0 Green—Graphics Border Color
Collision Enable	\$00		CMR 13 \$0FFF Buff—As Above
Real Time Output	\$00000000	Generates an interrupt when the CRT beam reaches the specified X,Y RTO setting.	CMR 14-CMR 1F \$0000
Real Time Input	\$00000000	An input pulse on this (lightpen) puts the current X,Y location into the register for your software to read. There is an input line for this function.	
Video Operation	\$12	256 x 192 sets screen size	
Sync Mode	\$04	Composite sync output	
Virtual Screen Start Address	\$00000000	With this you set the size of memory you need larger than the screen itself, then move the screen within it.	
Vertical Offset	\$00000000		
Horizontal Offset	\$00000000		
Virtual Screen Size	\$00001800	6K Screen (CoCo)	
Virtual Screen Width	\$00000020	32 Bytes (CoCo)	

This completes the main mapping of the CoCo RMS system. The numbers in the registers are what is put there to emulate the CoCo. Take note: This system is in Tandy's future, it will be, as rumor puts its, called the Model 9! (Like a Model 4 with Color and OS-9 level 2.)

I hope you have enjoyed this in-depth look at this new and complex chip set. I can only give you a small glimpse at the capabilities of this system (the users manual is 146 pages long). There are so many things this set can do. The manual is obtainable from Motorola Semiconductor products sector, consumer strategic marketing. Phoenix, Arizona. (602) 244-6381. (end)

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 *** NEWS FROM UNDER COLOR *** NEWS FOR UNDER THE COLORS ***
 ***** Compiled July 16, 1985 *****
 ** Send news to: Under Color, Box 6809, Roxbury, VT 05669 **
 ***** CompuServe 70136,1257 *****

128K MEMORY UPGRADE BOARDS have begun to appear. It's always hard to PICK A WINNER with new products, but judging from past performance, Spectrum Projects' THUNDER RAM hits the mark. According to Spectrum's press release, Thunder RAM emulates a 40-track RAMdisk, has a 60K print spooler option, a linking system to permit Basic programs up to 128K long, and techniques to store 30 or more high-resolution video screens. Thunder RAM is priced at \$119.95, and REQUIRES A DISK SYSTEM.

* * * * *

SPEAKING OF 128K, the still-invisible OS-9 computer that's been rumored for nearly a year is getting closer to reality. According to reliable sources, it will be offered in 128K AND 512K VERSIONS and will offer a choice of DOSes and languages. LESS-THAN-RELIABLE rumors also say that MS-DOS will run on the Model09, but DON'T BET ON IT. It's been hinted that PASCAL WILL BE OFFERED with an operating system known as DEFTDOS. UnderColor suspects this latter operating system may be more tongue-in-cheek than real.

* * * * *

MEMORY PRICES ARE DROPPING AGAIN. UnderColor has received an industry price sheet showing brand new 64K MEMORIES FOR 60 CENTS EACH ... \$4.80 a set! In New York, 47th Street Photo/Computer is selling 9-chip sets for the IBM PC for \$8.95. Quite a change from the days of \$100 upgrades. (Anyone remember when Radio Shack asked \$260 for a 16K upgrade?).

* * * * *

WATCH THOSE NEW EPROMS! Although most manufacturers are marking 12.5-volt programming voltages on the EPROMs, some are not. Here's a voltage check:

Part	Program at:
2716	25 volts
2732	25 volts
2732A	21 volts
2764	21 volts
2764A (when marked)	12.5 volts
27128	21 volts
27128A (when marked/not AMD)	12.5 volts
27256 (almost all)	12.5 volts
68764/66	25 volts

If in doubt -- call the manufacturer! The part number prefixes (such as TMM2764): HG or HN = Hitachi, MCM = Motorola, TI = Texas Instruments, AM = Advanced Micro Devices, i or D = Intel, MBM = Fujitsu, TMM = Toshiba, MM = National Semiconductor.

*** NEWS FROM UNDER COLOR *** NEWS FOR UNDER THE COLORS ***
***** Compiled July 16, 1985 *****
** Send news to: Under Color, Box 6809, Roxbury, VT 05669 **
***** CompuServe 70136,1257 *****

UPDATE ON CRC VALUES FOR DOSes. UnderColor published CRC's (checksums) for Color, Extended and Disk Basic. Here are some more:

Spectrum DOS	\$364F
JDOS V 1.2	\$CC1E

The above values provided by Bob Rosen from CoCoChecker, Radio Shack Express Order #90-289, \$19.95 on disk.

* * * * *

CALL THIS BULLETIN BOARD. R. Wayne Day is the system operator for a bulletin board he wants everyone to know about. Wayne is a COLORFUL AND CHATTY FAMILIAR to CompuServe's Color SIG, and his number is worth dialing. (817) 232-2087 connects you with TBBS Fort Worth at 300 or 1200 baud. It's free.

* * * * *

A 16K/64K SERIAL-IN SERIAL-OUT PRINTER BUFFER is almost ready from Green Mountain Micro. It will provide 600/4800 BAUD INPUT and 600 baud output with matching connectors for Radio Shack CoCos and printers. According to Green Mountain, an initial run of the 16K KIT VERSION WILL COST ABOUT \$50 to GMM's regular customers on a first-come, first-served basis. Green Mountain calls the low price a "thank you" to its regular customers.

* * * * *

UnderColor has been PROBING FOR A PHASE-OUT SCHEDULE for the Color Computer, but can't pin one down. Either Radio Shack DOESN'T PLAN ONE (after the surprise success of the CoCo) or it's quashed rumors pretty well. MOST SOURCES INSIDE AND OUTSIDE TANDY TOWERS give the Color Computer until fall of 1986 before it falls victim to the 09 machine and changing tastes.

* * * * *

Look for CHICLET-KEYBOARD COCOS on sale for \$60 by the time you read this. Apparently there are a lot of brand new grey and white Color Computer I machines still unsold, and stores will be encouraged to CLEAR THE SHELVES.

* * * * *

In the next issue we'll give you the SECRET OF USING TRUE LOWERCASE ON THE KOREAN-B COCO.

* * * * *

Summer Frippery

By Richard Ramella

It's summertime—a time of year when editors' and authors' minds turn to fripperies. Here are two for your enjoyment.

Penwell On Saturn

Our acquaintance Otis Penwell, who has made not one, but five, trips to Saturn, in addition to managing the greeting card shop over at the mall, recently returned from the ringed planet with records of the life and culture of the inhabitants.

He dropped by the office with his data on April 1.

Q: We gather you claim there are inhabitants of Saturn?

A: Of course! I would hardly visit the place if there were no one to talk to.

Q: Have you any proof?

A: Indeed! (He produces the program listing printed with this interview: Life on Saturn!) I have examples of two major

art forms from the planet. Type the Extended Color Basic listing, then type RUN and press Enter. You will hear and see the *Saturn Anthem*.

Q: Do you have any pictures of the Saturnians?

A: What would that prove? Type RUN 270 and press Enter to see a towering work, *The Saga of Mystigorp*, the original Saturnian script.

Q: Very impressive! Of course, we don't understand much of the plot. Also, it would have been nice to see some representations of the residents of Saturn. You know . . . eight-by-ten glossies.

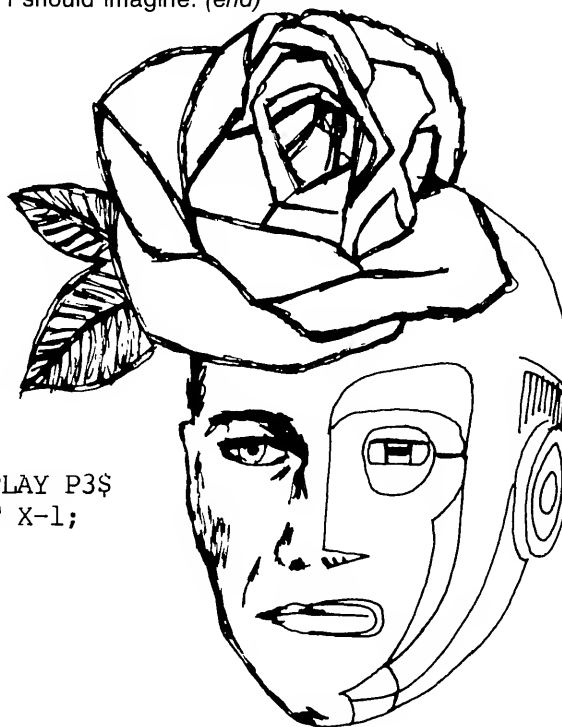
A: I'll be going back Tuesday next. I'll see what I can do.

Q: Thank you, Otis. It was a pleasure having you.

A: I should imagine. (end)

Program Listing. Life on Saturn!

```
100 REM * LIFE ON SATURN!
110 CLS 0: B$="FLAGONS OF SRIB "
120 S$=STRING$(128,128)
130 P1$="T8;O2;CCC;O1;GGG;O2;CCCC;P2"
140 P2$="T8;O2;DDD;O1;AAA;T2;O2;D;P8"
150 P3$="T8;O1;BBBBAGBBBB;P2"
160 P4$="T8;O3;GGGGAB;O4;CCCC;P1"
170 FOR B=0 TO 116 STEP 2
180 PRINT @ B,CHR$(241);: NEXT B: B=196
190 FOR X=99 TO 1 STEP -1: POKE 223,RND(128)
200 PRINT @ 320,X;B$"ON THE HRIX": PLAY P1$
210 PRINT X;B$: PLAY P2$
220 PRINT " TAKE ONE DOWN AND SNORF IT UP": PLAY P3$
230 IF X=1 THEN PRINT " NO MORE "; ELSE PRINT X-1;
240 PRINT B$"ON THE HRIX"
250 PRINT @ B,CHR$(128);: B=B-2: PLAY P4$
260 PRINT @ 320,S$;: NEXT X: GOTO 110
270 PMODE 4,1: COLOR 0,0: PCLS 1: SCREEN 1,0
280 FOR Y=15 TO 180 STEP 15
290 FOR X=0 TO 240 STEP 15
300 Z$="BM"+STR$(X)+", "+STR$(Y)+";"
310 FOR G=1 TO RND(7): Z$=Z$+MID$("UDLREFGH",RND(8),1)+STR$(RND(5)); NEXT G
320 DRAW Z$: CIRCLE(X,Y),RND(8),,RND(0),RND(0): NEXT X,Y: PCLS 1: GOTO 280
330 END
```



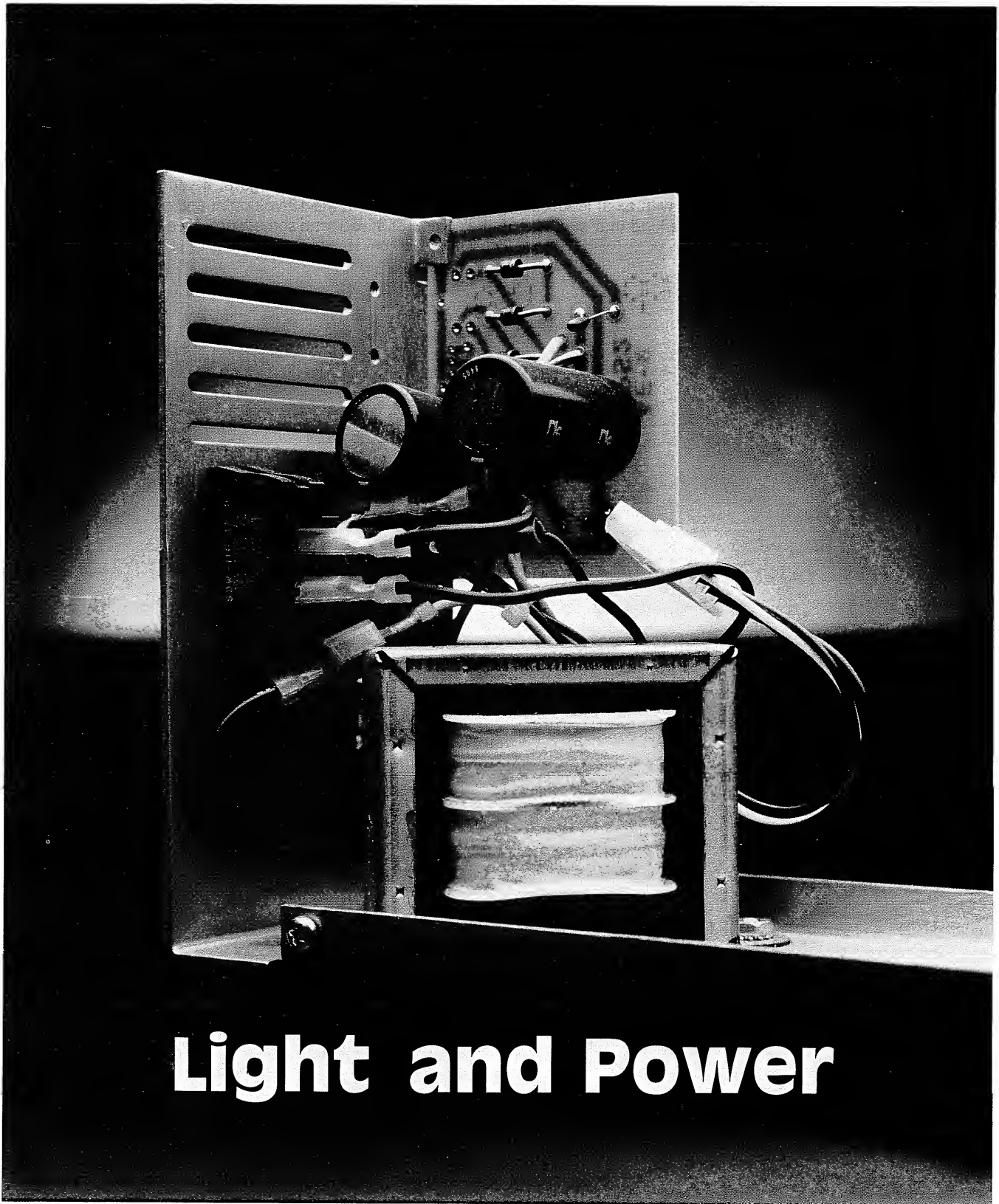
Flower Fantasy

Flower Fantasy is a 16K Extended Color Basic listing that shows development and change in a screen garden of

blooms. It continues until the Break key is pressed. Give it several minutes for good effect. If your machine does not support the "speed POKE" POKE 65495,0, eliminate this statement from the start of line 110. (end)

Program Listing. Flower Fantasy

```
100 REM * FLOWER FANTASY * TRS-80 EXTENDED COLOR BASIC 16K * RICHARD RAMELLA
110 POKE 65495,0: PMODE 1,1: PCLS: COLOR 3,1: SCREEN 1,1: POKE 65314,249
120 X=1/(2+RND(0)*12): M=RND(5)*51-25: N=RND(4)*48-25
130 Z=RND(3)+1: IF PPOINT(M,N)=Z+4 THEN 130
140 FOR A=1 TO RND(25) STEP 2: FOR G=0 TO .99 STEP X
150 CIRCLE(M,N),A,Z,1,G,G+.016: NEXT G,A: GOTO 120: END
```

Light and Power

by W.C. Clements, Jr.

The Color Computer 2 succeeds the original and slightly more elaborate machine that started it all. There have been a number of changes; it's smaller and lighter, and has a keyboard more like a typewriter. The circuit board has been streamlined, uses fewer integrated circuits and has a lighter-

duty power supply. The case is the so-called "double-insulated" type, which for consumer products is supposed to eliminate the need for the three-wire polarized power cord. Some corners have been cut, notably in the internal shielding; that is now foil-covered cardboard instead of the extensive steel shields used in the original machines. The smaller case leaves less room inside for the hardware experimenter to add stuff of his or her own.

Restoring +12 Volts

It's an easy job to add +12 volts back to the cartridge connector where it belongs. The original disk controller takes a negligible amount of power from the 12-volt line, so it won't load the already warm-running power transformer significantly. Figure 1 shows the circuit. Build it on a piece of perfboard about 2 inches square. Use capacitors with axial leads, as there isn't enough headroom to use the kind that stand on

end. When it's finished, get a sheet of double-stick foam (the kind that's sold to stick pictures on the wall, etc.), cut several small pieces, and apply several layers to the top of U2 and U3, to the right of the power transformer. Press the board down on the forms so that it's stuck securely, and connect the wires as shown in the Figure. If you have a voltmeter, connect it between the 12-volt point and ground and turn on the computer. If you read something between 11.75 and 12.25

Figure 1: +12-Volt Power Supply

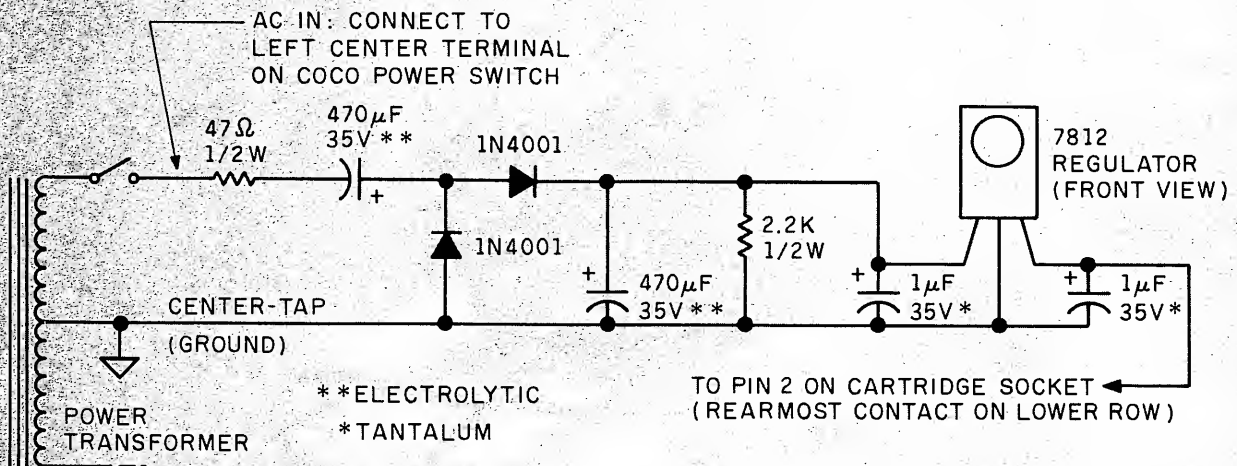
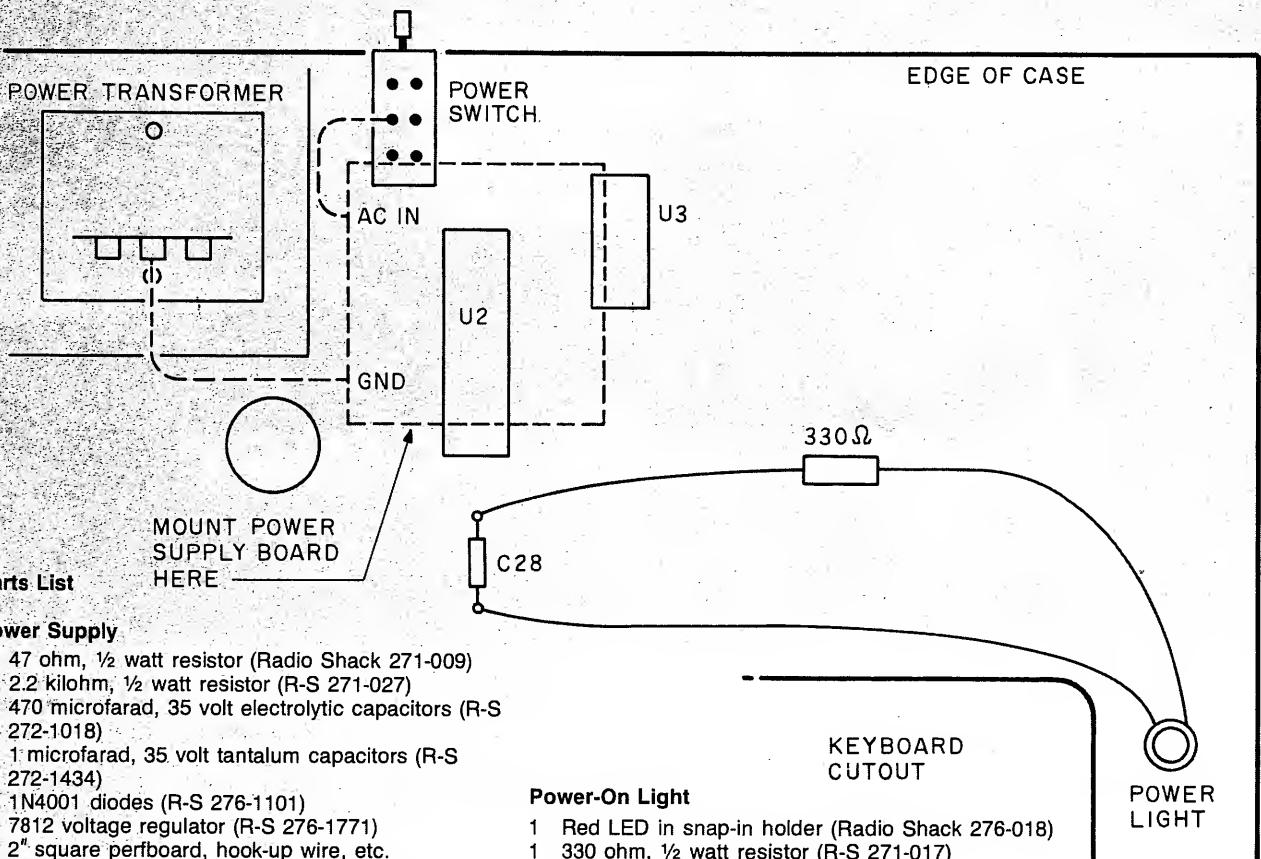


Figure 2: CoCo 2 Interior: Layout of Added Parts



volts, everything is ok.

Perhaps the change of most concern to users of the original CoCo, and particularly to those having an investment in peripheral equipment bought for it, is in the power supply. The CoCo 2 has only a 5-volt dc supply, lacking the +12 volt and -12 volt supplies that some plug-ins need. Furthermore, the power transformer is much lighter duty and runs warmer than the old version. An offhand visual comparison with the size and operating temperature of the original power transformer at least suggests that the CoCo 2 may not be able to supply quite as much power to peripherals as the old machine. Even worse, the original disk interface unit needs both +5 and +12 volts. A lot of people owning a CoCo with the original disk system will need a second machine for the spouse or the kids. They'll be dismayed to find they can't share their disk units between machines without buying the new 5-volt-only controller, too.

The power supply change is a more serious disadvantage for commercial users, where many computers can be involved. For instance, the Chemical Engineering Department at the University of Alabama uses CoCos in a small student computation facility, which at present consists of seven original machines (encompassing three of the circuit board revisions), with several disk systems and printers, and one CoCo 2. Since limited funds have resulted in there being more computers than disk interfaces, the students have to swap the controllers and drives among the machines as they are needed. Not only will the disk packs we have not work with the new machine, damage might be caused if one were acci-

dentally plugged into it, and that's a rather likely event in a multi-user situation. The WD1793 chip in the interface needs both voltages, and integrated circuits usually don't like to have only part of their supply voltages applied.

Power-on Light

As long as you're inside the computer, you might as well put in a power light. Buy the red LED in a holder that Radio Shack sells (No. 276-018), and get a 330 ohm, 1/4 watt resistor also. Drill a 5/16 inch hole in the top of the case to hold the lamp. I put it about 1 inch in from the right edge of the case and about 1-1/4 inch over from the rightmost column of keys, as Fig. 2 shows. Wherever you decide to put yours, be sure to look under the top cover and verify that there is room for the lamp under the chosen spot before you drill.

Before you mount the lamp, cut two pieces of small, flexible hook-up wire, each about a foot long. Solder one wire to the shorter lamp lead. Trim the resistor leads to 1/4 inch each, solder one end to the longer lamp lead, and solder the remaining wire to the other end of the resistor. Press the light into the hole until it snaps in place. Slip some insulating tubing over exposed wires, or wrap them with tape. Locate C28, which is a small capacitor on the circuit board just below U2. Connect the wire coming from the resistor to the end of C28 nearest U2, and the other wire to the bottom of C28. You might want to use a phone cable jack-and-plug combination (Radio Shack 274-283) on the lamp wires so you can remove the cover more easily in the future. (end)

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On Sig—



Fm: William Harris (to D. Kitsz)

My summary: The lack of a recognized, standardized set of disk I/O routines is preventing me, and most likely will continue to prevent, the addition of a couple of significant features to a chess program I am writing. I will never have the time to program a DOS on my own; I don't want to be incompatible with different ROMs, so I'll just leave the features out. Should my chess program ever go to market, there may be ways to do the things I want to do (write a Basic driver that loads information from the disk, or organize the disk in my own manner), but those solutions are far, far from the best. My own program's disk requirements are minimal. Unfortunately, said disk I/O problems will prevent many a programmer from producing his or her disk intensive-product.

Fm: Roger Bouchard (to A. Flexser)
True. We can't underestimate the will of Radio Shack to make things as difficult as possible for the average programmer. I guess then, the only alternative is to use something self-contained. What a waste of memory that is!

Fm: A. Flexser (to R. Bouchard)

That, or keeping abreast of ROM changes and modifying software in a timely fashion to accommodate the new ROMs along with the old. . . . a kludgey solution, but probably better in many

cases than the alternative of re-inventing the wheel.

Fm: Roger Bouchard (to A. Flexser)

To help in ROM changes updates, why not put all the ROM calls in one block of memory? Then jump to them either directly or indirectly. That way a software update can be as simple as modifying that block. Large computers provide this for their operating systems. When it is updated, you get a file. Load it in on top of the existing one or use a program built-in function, and the program does the rest. When a programmer uses undocumented ROM calls he (she) should use a similar method. That would make ROM compatibility a snap!

Fm: A. Flexser (to R. Bouchard)

Yes, that would making keeping up with ROM changes a little bit easier.

Fm: Roger Bouchard (to A. Flexser)

Just the man I should talk to, apparently. Looking for info on ADOS (sounds familiar?) Specially regarding Basic error-handling and double-sided fast-step drive support. To go back to the discussion at hand: at least that's the way I would write any piece of software.

Fm: A. Flexser (to R. Bouchard)

ADOS supports double-sided drives by treating the two sides as two separate drives. There is an error-trapping func-

tion in the new version, although you must give up the Peep command to have it, since both will not fit in an 8K EPROM. You can configure it for fast step-rates, and even have different step rates for different drives.

Fm: Roger Bouchard (to A. Flexser)

Stop it! I'm beginning to drool all over my keyboard!

Fm: William Harris (to J. Ross)

I agree with that; Tandy warned 'em, so they shouldn't complain . . . at least too loudly . . . but I think Marty is condemning the philosophy behind it more than the actual mechanics of living with it.

Fm: Marty (to W. Harris)

"Condemning the philosophy of it." "It" is the lack of file I/O vectors? We-ell. I guess that's one circumloquacious way to put it. I do condemn the programmers who did not use even the measly few vectors Tandy/Microsoft gave them, but I condemn Tandy and Microsoft vastly more severely for not providing truly useful vectors.

Fm: William Harris (to A. Flexser)

You know the one thing that would put me on Tandy's side . . . a free upgrade to disk ROM 1.2 or 1.3 or whatever!!! Of course it won't ever, ever, ever happen . . .

(Two replies are marked by *.)

*Fm: A. Flexser (to W. Harris)

Unless they put some extraordinary goodies into the new ROMs, you'd be better off declining that hypothetical free upgrade and keeping the ROMs that are compatible with the software you've got!

Fm: William Harris (to A. Flexser)

Ah, but you see, we're assuming I get to keep the old ones, too! Now, of course, this is getting really unrealistic. But for my own (programming) sake, I'd like to have a recent version of ROM lacking in some of the more hideous errors.

Fm: A. Flexser (to W. Harris)

What hideous errors are you referring to? Generally speaking, unlike the ROMs on some machines I've seen, the CoCo ROMs, even from the first, contained no bugs I'd put in the "hideous" class. That's why I see no strong reason to want the very latest ROMs in my machine.

Fm: William Harris (to A. Flexser)

That's true, no "hideous" errors per se. (And those we have can usually be worked around, right?) The error I had in mind when I made that statement was the field error, that requires occasional re-fielding. Or the close, which requires closing in exact reverse order. You're right, compared to other computers, there are no "hideous" errors. The Apple has so many of them, that they started calling them features! Some time when there isn't some furious debate going on, and I've had the time to think back on my Apple experience, I'll leave a few here on the Sig.

Fm: A. Flexser (to W. Harris)

That's probably made for fun reading, and ammunition the next time one meets an insufferable Apple owner who looks down his nose at our beloved machines!

Fm: William Harris (to A. Flexser)

Oh brother. Before I touched an Apple (you know, from observations in the college media center, playing some of the admittedly nifty games available, but not from programming it) I had a mistaken inferiority complex (that the Applists gladly foisted on me) that I had a second-class machine. Someday, when I got some money, I'd "move up" to the Apple. Brother, was I ever glad to get that part-time job programming those monsters. Saved me a lot of time and

money cursing Apple. (Of course, I cursed it anyway, but Imperial International was paying me—a significant difference!)

*Fm: Marty (to W. Harris)

Even if the new software cost Tandy nothing, it's hard for me to imagine they'd give away the hardware (masked ROM) for free! But even so, why are you in such an almighty rush to be the first proud owner of a new ROM from Tandy that might well have built in the interesting feature of making all the worthwhile third-party software (that is, all worthwhile software) unusable on your machine??!! I run Basic 1.1 and Disk 1.0, and am glad I do so. Sure, there are a few known bugs in those ROMs, most of which I've fixed in EPROM, but my entry points are the same.

Fm: William Harris (to Marty)

See my earlier message. I am assuming that the new ROM corrects the bugs, has clearly documented entry points, and I get to keep my old ROM for compatibility.

Fm: Roger Bouchard (to S. Trevor)

Ever given any thought to make it compatible with other ROMs than Radio Shack? If CIS isn't up to it, some users might do it out of sheer survival.

(Two replies are marked by •.)

• Fm: A. Flexser (to R. Bouchard)

It already is compatible with ADOS. ('Course, that required zero effort.)

Fm: John Ross (to A. Flexser)

Exactly zero, if I recall correctly.

Fm: A. Flexser (to J. Ross)

Hee hee! Point well taken.

• Fm: Marty (to R. Bouchard)

If you are complaining about incompatibility of Vidtex (or anything else) with JDOS, you're on very shaky ground. JDOS has gone through over a dozen revisions since its release. The first few versions reflected some of the grossest stupidity regarding compatibility that I've ever seen. Almost every lesson learned in the course of previous Microsoft ROM changes was blatantly ignored. JDOS is such trash from the point of view of compatibility that it is utterly unreasonable to ask any software supplier to make his or her stuff compatible with it.

Fm: A. Flexser (to Marty)

J & M's JDOS is of course one of the prominent victims of the very business we've been talking about concerning ROM vectors. JDOS has a lot of nice features, but for anyone who uses ML programs, has the crushing drawback of poor compatibility with existing third party software. JDOS could have been a much more worthwhile product if there'd been a good set of ROM vectors for it to make use of.

From: Roger Bouchard (to Marty)

Well, I was thinking more in line of Vidtex—any DOS compatible. How come a free, public-domain program manages to be compatible and even handle my double-sided drives, while Vidtex sadly dies at the smallest and most obvious changes (i.e., the sign-on message).

By the way, heard a lot of comment on ADOS. What can it do? Can it handle double-sided drives? Is it ROM only or do you need a special controller?

Fm: Marty (to R. Bouchard)

Vidtex is particularly incompetently programmed with respect to its ROM version recognition and specificity. Merely lazy, dumb coding is all. I hear tell that the new release may be better in this respect. After all, few programmers alive have the insight and talent of those who wrote WEFAX and GraphiCom. As for ADOS, why don't you ask Art Flexser about it? After all, he wrote it. And Wayne (Sysop here) and Don Hutchinson, I know, use it a lot. I use my own more minimally modified ROM, but I hear ADOS does the job, both for what it does and for its relatively high degree of compatibility with other software. I don't use it because most of its very excellent enhancements are for Basic, which I use very little.

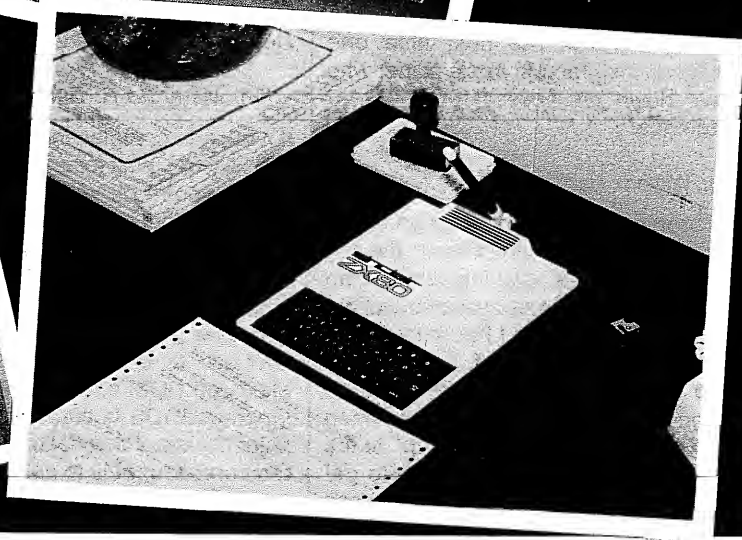
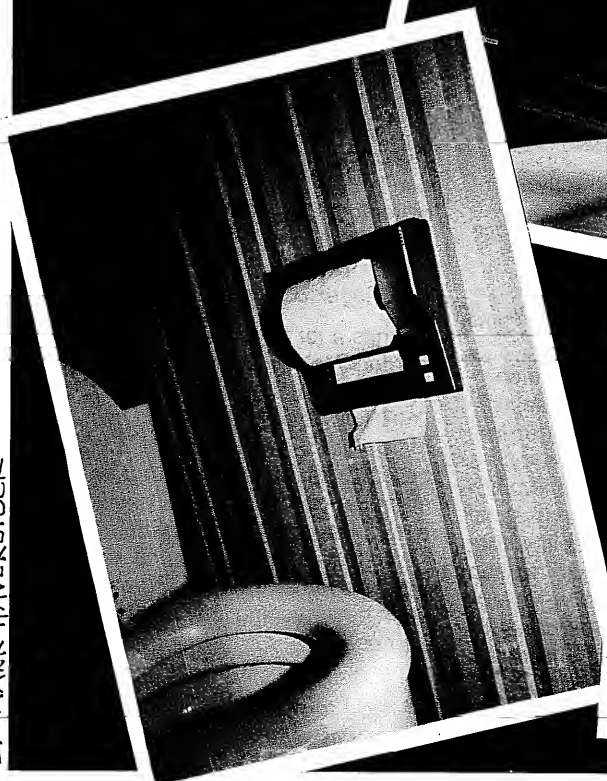
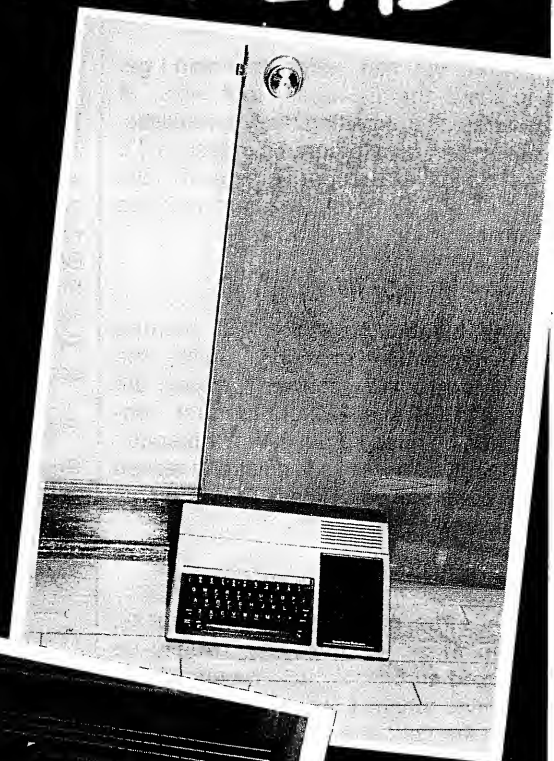
Fm: Roger Bouchard (to Marty)

Thanks a lot for the info; will ask Art. I am looking mostly for something that would make best use of my Shugart DSHH drives, though I would miss some of the JDOS enhancement. The incompatibility of assembly language with some pieces of software drives me to extremes—like hand-disassembling 8K of codes! By the way, the coding of Vidtex is rather ordinary. Frankly, I have seen better coding in CoCo arcade type games.

(A reply to this comment and the final part of this series, continues next issue.) (end)

Off Color:

101 USES FOR A DEAD COMPUTER



BY MARK HAVERSTOCK

Review— Disk Master

by David Gresch

Disk Master

Dataman International

420 Ferguson Ave.

Hamilton, Ont. LSL 4Y9

(414) 529-1319

Requires 16K, 1 disk drive

\$33.95 US disk, \$39.95 Cadn disk

Disk Master is a 16K disk utility package containing 12 programs. Two features are common to all of the utilities except SAK; the ability to rerun a program or to return to the main menu; you can also set output for the screen or printer.

Copy is an intelligent version of the back-up command, which eliminates the fragmentation of files on the destination disk and will not copy blank granules.

Disk-Sort sorts a disk directory and then saves the new directory.

The Modify M/L program adds an automatic execute loader to the end of any assembly language program.

The Disk Space utility displays the allocation table and shows whether a track is empty, full or partially full, and how many sectors are free.

Disk Look outputs a sector to the screen in hexadecimal and ASCII code. Disk Look will ask for a track number and then a sector number, but if you press Enter at the sector number prompt it will assume the track is instead a granule number. Since an entire sector can't be shown on a screen (at least the way Disk Look formats the screen), it is shown on two screens. To see the next screen you simply press the space bar.

One of the most useful utilities is the M/L program Address Finder, which finds the start, end, and execute addresses for any assembly language program.

The seventh option, not a disk utility, lets you change the printer baud and to go to the 64K all-RAM mode. This option supports all standard bauds from 300 to 9600.

The Backup Directory saves your disk directory and allocation table on the unused portion of track 17 (sectors 14-18). Thus, this utility will help you prepare for directory crashes so you can reconstruct your directory using the next program: Recov.

Once a directory is backed up using the BU-DIR utility and then crashes, you can use Recov. to recover and reconstruct the directory and allocation map. Unfortunately, if there is an error in the back-up the operation must be aborted.

The final Basic utility is Disk Directory, which shows an expanded two-line directory listing file

name, extension type, format, and (not mentioned in the documentation) the granules on which the file is located.

SAK (Swiss Army Knife), the only A/L program, is a compact disk utility which lets you read, write, modify, verify and display a disk directly. In SAK there are two buffers of 256 bytes to hold a sector in each. The primary buffer is displayed on the top half of the screen, while the secondary buffer can only be accessed by the save and unsave commands. On the bottom two lines are listed all the possible commands.

If you have a non-R/S DOS you must enter the Drive command, which will let you use any number of tracks and also let you use a drive besides drive 0.

Did you know your CoCo can read? With the Sector command you can read a specific sector; with Granule you read the first sector in the granule number you entered in hex. Using the File command displays the first sector in a file. With the Directory command you read sector 1 on track 17; and with F.A.T. the file allocation table is read into the primary buffer.

The next command, Write, writes the primary buffer to any disk sector. Congratulations to Ralph Bloch, the author who provides us with a safety catch by asking us, "Are you sure?" to prevent a disk disaster.

Verify tests a disk, sector by sector, to see if there are any errors. You can opt to begin at track 0 or at the sector the disk head is currently at. If by chance you run across an error, you are put back into the command area and may modify the offending sector using the Modify option.

Modify places a cursor on the screen, which you control using the arrow keys. It shows you the ASCII value for the character underneath the cursor, and you may enter an ASCII value to change the character. You may also press Enter and enter the character change directly from the keyboard, but for this to do any good you must save the change using the Write command.

Hexout is a display command which shows you a sector in hex; while doing this it shows you the place on the sector and a character representation of what it actually looks like.

Two other read options are Next and Last. After reading in a sector you may choose to read the next sector or the sector before that into the primary buffer. Finally, after doing all you want, you may enter Basic with the End command.

Does everything work as it should? Unfortunately, when you send information to the printer it will not show up on the screen. Unfortunately, the Granule command asks for a granule number in hex. Why should a beginner be forced to learn hex just to use one program? And why should you have a fair Basic version of the Hexout program (Disk-Look) on the same disk with a much better A/L version?

On the brighter side, there is a well-done description of the theory of disks for beginners in the back of the manual. There is also a warranty and support card in the back of the three ring manual, asking for your and your dealer's addresser. And fortunately, there is a back-up of every program on an unprotected disk.

Reviews

The final killer question is, "Is it worth \$34?" With good documentation, and the quality of material used, and with every program costing just \$2.829166 . . . to me it is worth having error-free disks with backed-up, and alphabetized directories. But you must decide on the utility of each program

and the package's total value for yourself. At least, that's what my Econ book says Have a safe trip on Disk Drive.

If *Good Morning, America* can call liquor sales intoxication . . .

Notes . . .

- I've just started Dennis' course, "Learning the 6809" this past week. I began lesson 5 and thought "I wonder how much time I'm spending on these lessons in one sitting?" So, I loaded the source code for the Real-Time clock which appeared in *UnderColor*, vol. 1, and assembled it with ORG \$7F00 and changed line 180 to JMP \$C000. Now I can use EDTASM+, follow the course, and wonder how come it's taking so long for the information to sink in!

Naturally, I lose a few seconds with cassette functions, but what's a few seconds (not much in Basic, but in ML . . .). I like the way the course is set up—repetition is the best learning! Good luck with *UnderColor* and one of these days, "I be bad" in ML with your help. **David Seibold**

- That quote by Arthur Doyle has been circulated more than I think it should have been. I'm referring to the "Primeval Swamp." That's the kind of thing that makes me get my editor assembler out and try harder.

I think it's unreasonable to expect a \$200 computer to perform like a \$3000 one. We are very lucky that Tandy used a 6809E CPU, but it is not a 16-bit Intel.

There are a lot of people chomping on the bit for the new CoCo. Everyone thinks it's going to be totally compatible, but I myself doubt it. I plan to stay with my CoCo II and wait a little longer before I go to 128K. By summer I might be able to get the upgrade for \$60. I'll still have that one big problem though. It seems that no matter what, all I'll have is 32K in each page of memory. Why didn't someone do it the right way with a true 48K? That's what sways programmers toward Commodore, Apple and Atari. You have to have memory. I can get 40K for Basic (no graphics whatsoever) but that's it. Isn't there a way to free more memory in the PMODEs? I just got through with an article in a recent *Creative Computing* which freed up 8 more colors for an Apple in high resolution. It's a very short assembly listing.

I have to say that programmers should make their software compatible with all versions of ROM. It's very frustrating to get a program that works great with the 1.1 ROM and dogs out with the 1.2. Since I know the fix, why don't they?? Still, I can't get too mad because the CoCo needs all the programmers it can attract.

I bought your magazine on blind faith. I'll never get over the demise of *TCCM*. It was a great magazine. I think all CoCo owners should be sorry about *TCCM*.

Thank you for your review of CoCo Max. I wrote Colorware about it but got no reply. Your review answered my questions except my one about the CGP-220. I'm sure it'll work in bit image, but what

about color dumps?

Also, thank you for the review of Quality Christian Software. As a born-again I have to respect what they're doing. One thing that *really* irks me, though, are spelling errors. I see no excuse for this in a program. It really cheapens the product.

In your February 1 issue you wished us the very best. I have to reverse this and sincerely wish you and *all* the people uninvolved with *UnderColor* every good thing that can happen in '85. In my estimation you have already surpassed *Hot CoCo*, and that happened in the first issue. I will try to do what I can to get you a couple more subscriptions here in Montana. A lot of your articles are over my head or beyond my budget, but they stir my imagination. Stay with it. If you need to raise rates I'll be the first to send more money. **Jay C. Thomas**

Information . . .

- I have been a subscriber to *UnderColor* since its first issue, and have been quite happy with it. I would like to submit the following info to help out other CoCo users who might have the RGS Micro 10 meg. hard disk system . . .

I recently bought the RGS Micro 10 meg. hard disk drive that I use under R.S. OS-9. When I bought the RGS OS-9 drive for the hard disk I found some bugs in the software that I wish to pass onto others. When RGS made the OS-9 drive they made a mistake that sets the 10 meg. hard disk up in 8-sector clusters under OS-9. This will rob you of a lot of disk space! I can tell you how to patch the disk so it will read in 1-sector clusters. On a 10 meg. hard disk under OS-9 you will get 40,300+ sectors to use in 1-sector clusters.

If you intend to use the hard disk under Radio Shack DOS or the hard disk DOS, you must turn the hard drive on about 20 seconds before you turn your CoCo on. If you don't do this the hard drive will lock-up your system and put garbage on your screen. Under OS-9 you must let the hard disk warm up for 20 seconds before you try accessing it. If you don't the OS-9 will lock-up, and you will have to reset the CoCo.

If you would like to talk to me about this . . . and this will also work with the 5 and 20 meg. hard disks . . . then contact me by EMAIL on CIS at 71615,531 or call me between 6 PM-9 PM EST at 215-277-6951. Last but not least, I can be reached at: Bob Montowski B-18 1151 Sterigere St., Norristown, Pa. 19403

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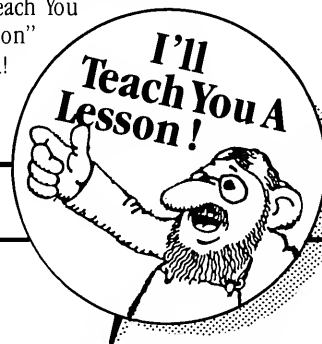
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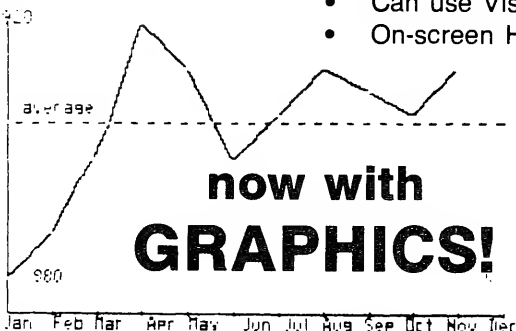
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